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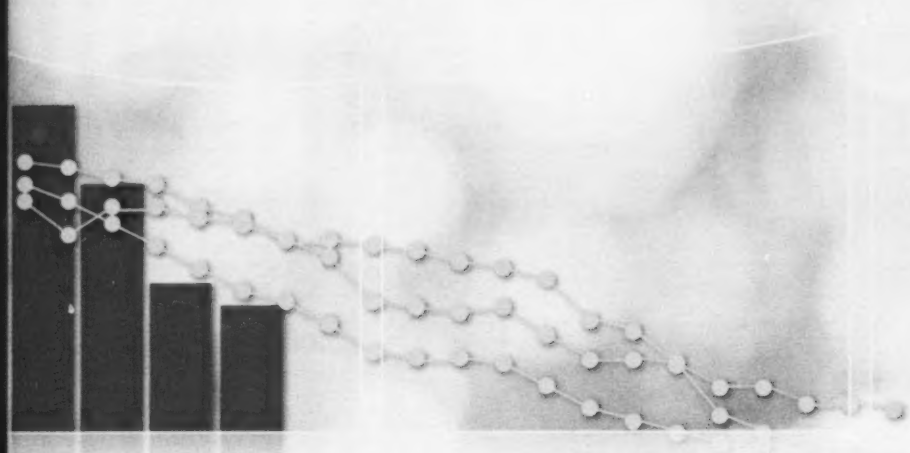
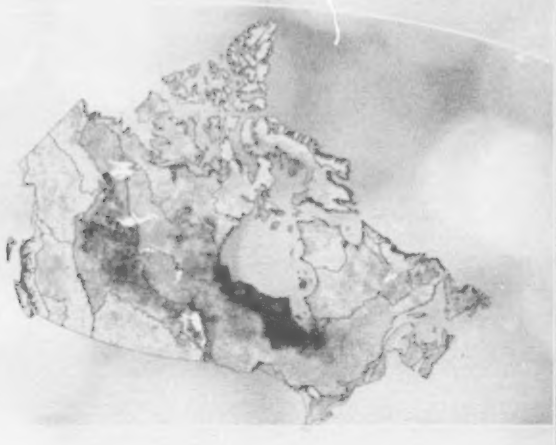
Canadian Environmental Sustainability Indicators

Polybrominated diphenyl ethers in fish and sediment





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Polybrominated diphenyl ethers in fish and sediment

August 2018

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Polybrominated diphenyl ethers in fish and sediment

Polybrominated diphenyl ethers (PBDEs) are used as a flame retardant in many products such as building materials, plastics and textiles. They are toxic substances that remain in the environment for long periods after their release. They build up in living organisms such as fish, seals and birds and have a harmful effect on species health and biodiversity. PBDEs are not manufactured in Canada, but can enter the environment when articles containing PBDE are disposed of. These indicators assess PBDE concentrations in fish and sediments against the Federal Environmental Quality Guidelines.[1]

Polybrominated diphenyl ethers in fish

Key results

Across Canada, concentrations of some PBDEs were consistently below guidelines while other PBDEs were often above guidelines. From 2013 to 2015, fish sampling was conducted in 10 drainage regions in Canada. Concentrations for 4 subgroups of PBDE were analyzed.

- TriBDE and hexaBDE concentrations were below the guidelines in all samples
- TetraBDE concentrations were below the guidelines for all but 1 sampled drainage region
- PentaBDE concentration were above the guidelines for 8 of the 10 sampled drainage regions

Table 1. PBDE subgroup concentrations in fish relative to guidelines by drainage regions, Canada, 2013 to 2015

Sampled drainage regions	triBDE	tetraBDE	pentaBDE	hexaBDE
Columbia	✓	✓	X	✓
Yukon	✓	✓	X	✓
Peace–Athabasca	✓	✓	X	✓
Lower–Mackenzie	✓	✓	✓	✓
Assiniboine–Red	✓	✓	X	✓
Lower–Saskatchewan-Nelson	✓	✓	X[A]	✓
Churchill	✓	✓	X	✓
Great Lakes	✓	X[A]	X	✓
St. Lawrence	✓	✓	X	✓
Maritime Coasta	✓	✓	✓	✓

X Exceeded guidelines ✓ Below guidelines

Data for Table 1

Note: [A] Represents a change between the results from the 2011 to 2012 sampling campaign and the 2013 to 2015 sampling campaign. A green check-mark (✓) means no sample collected in the drainage region returned a concentration reading above

[1] The Federal Environmental Quality Guidelines are numerical limits established under the Chemicals Management Plan to protect aquatic life. Concentrations below the guidelines are not of concern, while concentrations above guidelines indicate that further evaluation may be required.

the guideline. A red X-mark (x) means at least 1 sample collected in the drainage region returned a concentration reading above the guideline.
Source: Environment and Climate Change Canada (2017) Chemical Management Plan Monitoring and Surveillance.

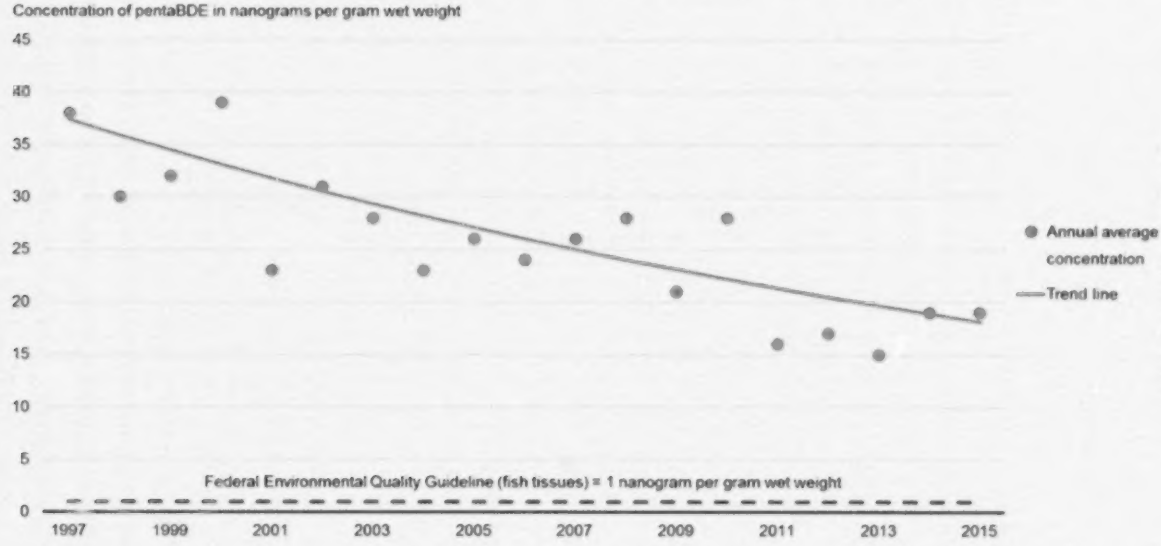
The results of the 2013 to 2015 sampling campaign indicate a deterioration in comparison to the 2011 to 2012 sampling campaign in 2 cases. The 2013 to 2015 campaign found fish samples exceeding tetraBDE in Great Lakes and pentaBDE in Lower Saskatchewan–Nelson. In the case of the Lower Saskatchewan–Nelson region, however, the change is very small and could be due to changes in exposure and take-up and not necessarily an increase in levels in the environment.

Trends in pentaBDE concentrations in fish in Lake Ontario

Key results

- Since 1997, the concentrations of pentaBDE in Lake Trout collected from Lake Ontario have declined at an average annual rate of 4%
- Despite the decline, levels of pentaBDE in fish were still above the guideline

Figure 1. PentaBDE concentrations in Lake Trout from Lake Ontario, Canada, 1997 to 2015



Data for Figure 1

Note: PentaBDE concentrations are expressed as an annual geometric average in this chart. A downward statistical trend is detected at the 95% confidence level for the time series. In 2013, Environment and Climate Change Canada published Federal Environmental Quality Guidelines for PBDEs to assess the ecological significance of levels of PBDEs in the environment.
Source: Environment and Climate Change Canada (2017) National Fish Contaminants Monitoring and Surveillance Program.

Currently, there is insufficient data to determine the trends of PBDE concentrations in fish from other Canadian drainage regions.

Polybrominated diphenyl ethers in sediment

Key results

From 2007 to 2016, sediment sampling was conducted in 10 drainage regions. Concentrations for 6 subgroups of PBDE were analyzed.

- For PBDE subgroups triBDE, hexaBDE and octaBDE, all concentrations in the drainage regions sampled were below the guidelines
- For pentaBDE, decaBDE and tetraBDE, 4, 7 and 9 drainage regions, respectively, had samples with a concentration below the guidelines

Table 2. PBDE subgroup concentrations in sediment relative to guidelines by drainage regions, Canada, 2007 to 2016

Sampled drainage regions	triBDE	tetraBDE	pentaBDE	hexaBDE	octaBDE	decaBDE
Pacific Coastal	✓	✓	X	✓	✓	X
Okanagan–Similkameen	✓	✓	X	✓	✓	✓
Columbia	✓	✓	✓	✓	✓	✓
Yukon	✓	✓	✓	✓	✓	✓
Assiniboine–Red	✓	✓	✓	✓	✓	✓
Lower Saskatchewan–Nelson	✓	✓	X	✓	✓	✓
Great Lakes	✓	X	X	✓	✓	X
St. Lawrence	✓	✓	X	✓	✓	X
Maritime Coastal	✓	✓	X	✓	✓	✓
Newfoundland–Labrador	✓	✓	✓	✓	✓	✓

X Exceeded guidelines ✓ Below guidelines

Data for Table 2

Note: A green check mark (✓) means no sample collected in the drainage region returned a concentration reading above the guideline. A red X-mark (✗) means at least 1 sample collected in the drainage region returned a concentration reading above the guideline.
Source: Environment and Climate Change Canada (2017) Chemicals Management Plan Environmental Monitoring and Surveillance.

The analysis found that sediment samples from the Pacific Coastal, Okanagan–Similkameen, Lower Saskatchewan–Nelson, Great Lakes, St. Lawrence and Maritime Coastal drainage regions had pentaBDE concentrations above the guidelines.

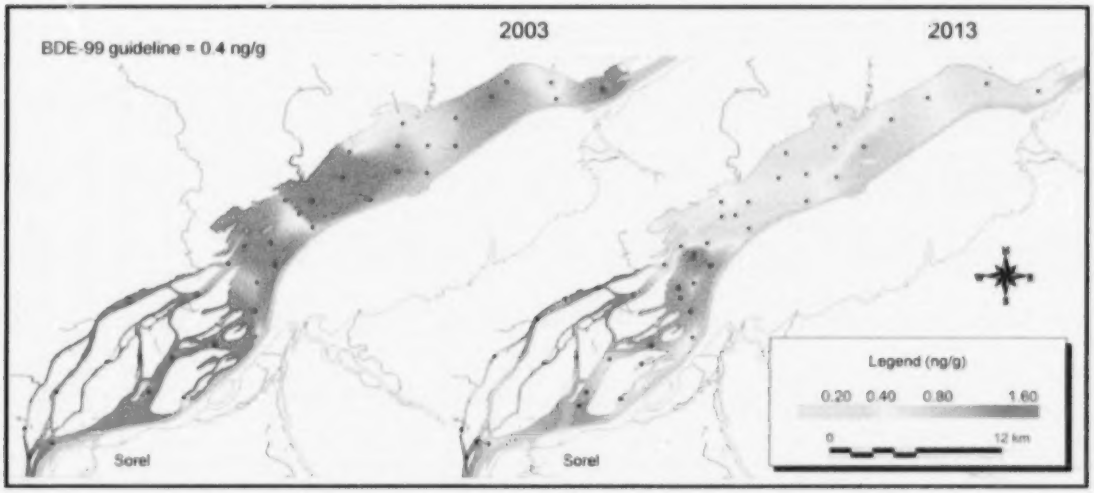
Sediment from the Great Lakes, St. Lawrence and Pacific Coastal drainage regions had decaBDE concentrations above the guideline. Only the Great Lakes region had concentrations above the guidelines for tetraBDE (2015 to 2016 sampling).

Polybrominated diphenyl ethers in sediment in Lake St. Pierre

Key results

- Sediments collected in 2003 and 2013 at Lake St. Pierre, part of the St. Lawrence drainage area, show a 59% decrease in the concentrations of pentaBDE[2]

Figure 2. PentaBDE concentrations in sediments from Lake St. Pierre, Canada, 2003 and 2013



Note: The Federal Environmental Quality Guideline in sediment for pentaBDE (congener BDE-99) is 0.4 nanograms per gram (ng/g) of dry weight and is shown in yellow on this map. The concentration values are shown in orange when they are twice the value of the guidelines and in red when they are 4 times or more above the guideline. Concentrations below the guideline value are expressed in green (if the values are half the guideline) or in blue if the values are well below half the guideline. Points represent the sampling sites.
Source: Environment and Climate Change Canada (2018) Sediment quality status of Lake Saint-Pierre in 2013. Monitoring changes in the state of the St. Lawrence.

Sediment sampling in many drainage regions of Canada does not go back far enough to establish long-term trends in these contaminants. However, sediments collected in 2003 and 2013 in Lake St. Pierre give a view of how concentrations are decreasing. The overall average concentration of pentaBDE decreased from 0.87 ng/g to 0.36 ng/g in Lake St. Pierre over a 10-year period. Given domestic and international risk management for PBDEs, this downward trend is expected to continue.

About the indicators

What the indicators measure

These indicators identify the drainage regions where concentrations are below or above the Federal Environmental Quality Guidelines (the guidelines) for polybrominated diphenyl ethers (PBDEs) in fish and sediment. The guidelines were developed under the Chemicals Management Plan and are used in this report to evaluate whether, and the degree to which, concentrations in the environment exceed the guidelines.

[2] Pentabromodiphenyl ether: pentaBDE # 99. Other pentaBDE congeners have rarely been detected above guidelines.

Why these indicators are important

These indicators provide information on the presence of PBDEs in the environment and on the progress of strategies and policies to reduce or control their occurrence in the environment.

Polybrominated diphenyl ethers (PBDEs) are commonly used as additive flame retardants, added to materials (or products) being treated for flame resistance. Since PBDEs are not chemically linked to the products in which they are used, they are slowly and consistently released throughout the production, use and disposal stages of the products.

TetraBDE, pentaBDE and hexaBDE subgroups can bioaccumulate over time in certain organisms such as fish. These substances have a tendency to biomagnify through food webs, potentially resulting in high concentrations in animals, such as predatory fish, birds and mammals. PBDEs may break down in the environment or within organisms from higher (decaBDE) to less brominated PBDEs (pentaBDE).

Polybrominated diphenyl ethers are persistent organic pollutants and they have been managed under the Chemicals Management Plan. Currently, the use of PBDEs is declining because most commercial mixtures containing these chemicals have either been voluntarily phased out by manufacturers or are subject to prohibition in Canada.

The PBDEs that were assessed have been declared "toxic" as defined by the Canadian Environmental Protection Act, 1999. Among the PBDE subgroups that were assessed, tetraBDE, pentaBDE and hexaBDE were found to meet the criteria for virtual elimination under the act. As a result, the Government has prohibited the manufacture, use, sale, offer for sale and import of tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE, nonaBDE, decaBDE, and all products that contain such PBDEs, with a limited number of exemptions, to minimize their release in the environment.

The PBDEs found in the Canadian environment are not only from domestic sources but also from international sources since PBDEs may be suspended in air and transported over long distances. As such, Canada is a party to 2 international agreements that target the elimination of the production, use, import and export of PBDEs: the global Stockholm Convention on Persistent Organic Pollutants under the United Nations Environment Programme and the regional Protocol on Persistent Organic Pollutants to the Convention on Long-range Transboundary Air Pollution under the United Nations Economic Commission for Europe. Canada is also a party to the Rotterdam Convention, the aim of which is to minimize PBDEs in the environment.

Long-range transport of PBDEs to Canada, presence in certain products, widespread use in the past and slow breakdown following release means that PBDEs still remain in the environment across Canada. Current human exposure to PBDEs is well below levels that are considered to be of concern.

Related indicators

The Perfluorooctane sulfonate (PFOS) in fish and water indicators identify the drainage regions where concentrations of PFOS in fish and water are above the Federal Environmental Quality Guidelines.

Safe and healthy communities

These indicators support the measurement of progress towards the following 2016–2019 Federal Sustainable Development Strategy long-term goal: All Canadians live in clean, sustainable communities that contribute to their health and well-being.

Data sources and methods

Data sources

The polybrominated diphenyl ethers (PBDEs) environmental concentration data were obtained from Environment and Climate Change Canada's Chemical Management Plan Monitoring and Surveillance Program.

More information

The sampling locations for fish and sediment varied throughout the reporting years. Data for fish and sediments were gathered in as many drainage regions as permitted by program capacity in any year. To provide a better representation of each drainage region, all the samples for all the recent available years, namely 2013 to 2015 for fish and 2007 to 2016 for sediment, were used to calculate the indicators.

There is a time lag of 3 years between the sampling date and publication of the indicators. This time lag is due to the time required to perform the monitoring, to compile the data, to validate (that is, perform quality assurance and control), analyze, review and report on the indicators, and to ensure enough recent data is available for comparison with past data or previous editions of the indicators.

Polybrominated diphenyl ethers are a group of chemicals containing 209 compounds. They are classified into 8 subgroups known as homologues, based on the number of bromine atoms they contain. In these indicators, 4 of the 8 subgroups are considered in fish, and 6 of the 8 subgroups are considered in sediment.

Table 3. Polybrominated diphenyl ether subgroups used in the indicators

Subgroup	Chemical group name	Fish	Sediment
triBDE	tribromodiphenyl ether	X	X
tetraBDE	tetrabromodiphenyl ether	X	X
pentaBDE	pentabromodiphenyl ether	X	X
hexaBDE	hexabromodiphenyl ether	X	X
octaBDE	octabromodiphenyl ether	-	X
decaBDE	decabromodiphenyl ether	-	X

Federal Environmental Quality Guidelines

The Federal Environmental Quality Guidelines (the guidelines) provide benchmarks for the quality of the ambient environment. Where the guideline is met there is low likelihood of adverse effects on the protected use (for example, aquatic life or the wildlife that may consume them). The guidelines can serve 3 functions:

- they can aid in preventing pollution by providing targets for acceptable environmental quality
- they can assist in evaluating the significance of concentrations of chemical substances currently found in the environment (monitoring of water, sediment, and biological tissue)
- they can serve as performance measures of the success of risk management activities

The guidelines were developed under the Chemical Management Plan. Measured concentrations exceeding the guideline levels indicate the potential for aquatic organisms to be affected by PBDEs in those locations.

Table 4. Federal Environmental Quality Guidelines for polybrominated diphenyl ethers

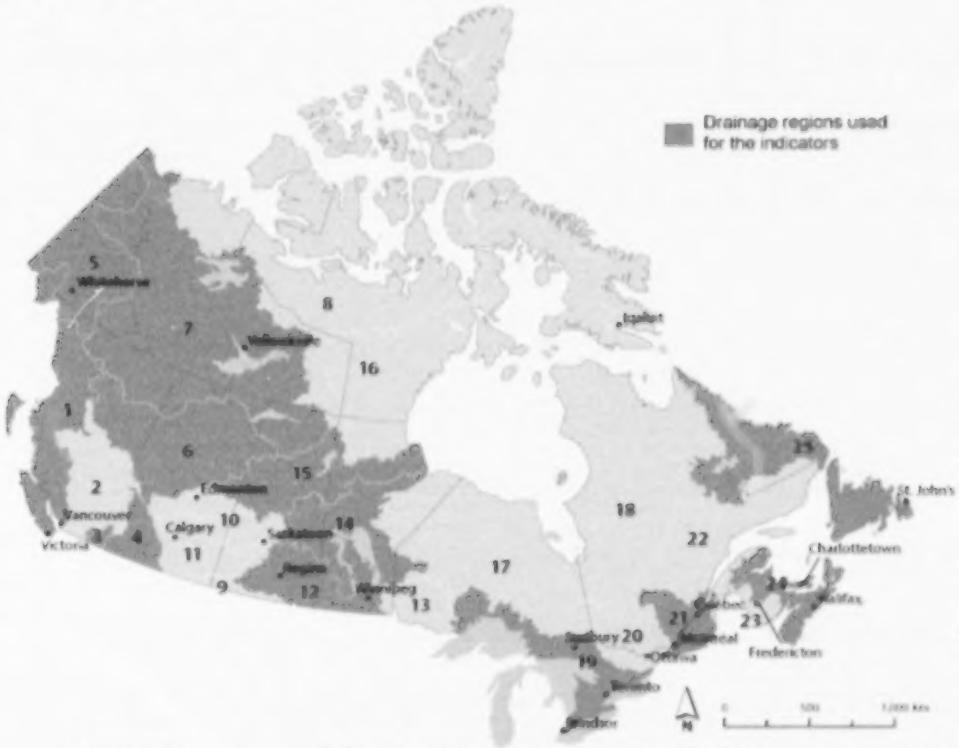
PBDE Subgroup[A]	Federal Environmental Quality Guideline for fish tissues (nanograms per gram wet weight)	Federal Environmental Quality Guideline for sediment[B] (nanograms per gram dry weight)
triBDE	120	44
tetraBDE	88	39
pentaBDE	1	0.4
hexaBDE	420	440
octaBDE	n/a	5600[C]
decaBDE	n/a	19[C][D]

Note: n/a = not applicable. [A] The guidelines for triBDE, tetraBDE, hexaBDE and decaBDE are based on data for chemicals BDE-28, BDE-47, BDE-153 and BDE-209, respectively, unless otherwise noted. Congener-specific guidelines exist for BDE-99 and BDE-100. [B] Values normalized to 1% organic carbon. [C] Values adapted from the Ecological Screening Assessment Report. Sediment FEQGs for octa- and deca-BDE were adapted from the Ecological Screening Assessment Report by being corrected for the sediment organic carbon in the actual tests, and then normalized to 1% organic carbon instead of the 4% in the Ecological Screening Assessment Report. [D] Based on a mixture of decaBDE with some nonaBDE.

Spatial coverage

The PBDEs in fish and sediment indicators use water drainage regions as the geographical unit for the calculation of the national indicators. These drainage regions correspond to those defined in Statistics Canada's Standard Drainage Area Classification.

Figure 3. Geographic extent of the drainage regions used for the indicators



Methods

The Polybrominated diphenyl ethers (PBDE) in fish and sediment indicators are presented by drainage regions showing whether or not PBDE concentrations in fish and sediment have exceeded the Federal Environmental Quality Guidelines (the guidelines).

More information

Monitoring for PBDEs was conducted for fish in 10 drainage regions for the 2011 to 2012 and 2013 to 2015 periods. Monitoring for PBDEs in sediments was conducted in 10 drainage regions between 2007 and 2016. Samples with PBDE concentrations above the guidelines are defined as an exceedance.

As PBDE guidelines are listed by subgroup, the exceedances are also presented by subgroup. For PBDEs in fish, sample measurements were conducted in representative predatory fish (Lake Trout, Walleye, Cutthroat Trout, Rainbow Trout or Brook Trout). For PBDEs in sediment, samples consist of surface sediment. To summarize the indicators,

drainage regions with at least 1 exceedance are categorized as a "drainage region with at least 1 sample above the guideline."

PentaBDE trends in fish from Lake Ontario

A retrospective analysis of PBDE concentrations in Lake Trout from Lake Ontario was completed using samples preserved in the National Aquatic Biological Specimen Bank, in order to extend the monitoring timeline back to 1997. Annual average concentrations of PBDE homologues were determined in whole Lake Trout samples. The indicator only shows the pentaBDE levels (since other homologues did not exceed the guidelines).

The annual geometric average for pentaBDE concentrations in Lake Trout from Lake Ontario is shown with a 95% confidence level. A statistically significant decreasing trend line is reported at the 95% confidence level. The equation for the curved trend line is:

$$\ln[\text{pentaBDE}] = \text{intercept } [83.7] - \text{slope } [0.0401] \times \text{year}$$

where:

ln is the natural logarithm

pentaBDE is the pentaBDE concentration

year is the data year

PentaBDE in sediment in Lake St. Pierre

The information for this indicator was retrieved from the Sediment quality status of Lake Saint-Pierre in 2013 factsheet. Concentrations of pentaBDE in Lake St. Pierre were extrapolated to areas between sampling site locations by a method involving an ellipsoid distribution oriented in the direction of the river flow.

Caveats and limitations

Monitoring and surveillance of PBDEs in lakes and rivers under the Chemicals Management Plan began in 2007 (except for Lake Ontario, which was initiated in the 1990s, and Lake St. Pierre, which was initiated in 2003).

Monitoring is not necessarily performed at the same location each year because of challenges in obtaining fish or sediment samples. These challenges include remoteness, shipping logistics and resource constraints. Given this, a comparison from one year to the next at the national level is not yet possible. That is why the PBDEs in fish and sediment indicators are estimated by grouping the samples for all recent available years by drainage area: 2013 to 2015 for PBDEs in fish and 2007 to 2016 for PBDEs in sediment.

Resources

References

Environment Canada (2010) Risk Management Strategy for Polybrominated Diphenyl Ethers (PBDEs). Retrieved on January 31, 2018.

Environment Canada (2011) Environmental Monitoring and Surveillance in Support of the Chemicals Management Plan. Retrieved on January 31, 2018.

Environment Canada (2011) Polybrominated Diphenyl Ethers in the Canadian Environment. Retrieved on January 31, 2018.

Environment Canada (2012) Canada's National Aquatic Biological Specimen Bank and Database. Retrieved on January 31, 2018.

Environment Canada (2013) Federal Environmental Quality Guidelines (FEQGs). **Retrieved on January 31, 2018**

Environment and Climate Change Canada (2018) Sediment quality status of Lake Saint-Pierre in 2013. Monitoring changes in the state of the St. Lawrence. **Retrieved on April 15, 2018.**

Annex

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Table 1. PBDE subgroup concentrations in fish relative to guidelines by drainage regions, Canada, 2013 to 2015

Sampling period	Sampled drainage region	Sample size	triBDE (number of exceedences)	tetraBDE (number of exceedences)	pentaBDE (number of exceedences)	hexaBDE (number of exceedences)
2013 to 2015	Columbia (4)	8	0	0	8	0
2013 to 2015	Yukon (5)	30	0	0	13	0
2013 to 2015	Peace–Athabasca (6)	30	0	0	23	0
2013 to 2015	Lower Mackenzie (7)	30	0	0	0	0
2013 to 2015	Assiniboine–Red (12)	30	0	0	13	0
2013 to 2015	Lower Saskatchewan–Nelson (14)	32	0	0	3	0
2013 to 2015	Churchill (15)	60	0	0	52	0
2013 to 2015	Great Lakes (19)	138	0	1	138	0
2013 to 2015	St. Lawrence (21)	36	0	0	36	0
2013 to 2015	Maritime Coastal (24)	17	0	0	0	0

Table A.1.1. PBDE subgroup concentrations in fish relative to guidelines by drainage regions, Canada, 2011 to 2012

Sampling period	Sampled drainage region	Sample size	triBDE (number of exceedences)	tetraBDE (number of exceedences)	pentaBDE (number of exceedences)	hexaBDE (number of exceedences)
2011 to 2012	Columbia (4)	19	0	0	19	0
2011 to 2012	Yukon (5)	19	0	0	11	0
2011 to 2012	Peace–Athabasca (6)	20	0	0	13	0
2011 to 2012	Lower Mackenzie (7)	10	0	0	0	0
2011 to 2012	Assiniboine-Red (8)	10	0	0	6	0
2011 to 2012	Lower Saskatchewan–Nelson (14)	22	0	0	0	0
2011 to 2012	Churchill (15)	30	0	0	28	0
2011 to 2012	Great Lakes (19)	89	0	0	89	0
2011 to 2012	St. Lawrence (21)	18	0	0	18	0

2011 to 2012	Maritime Coastal (24)	10	0	0	0	0

Note: The number in parentheses beside the drainage region name represents the identifier number of the drainage region. See Figure 3 for the drainage region map. For the 2013 to 2015 period, samples were collected from the catch of 411 representative predatory fish (Lake Trout, Walleye, Cutthroat Trout, Rainbow Trout or Brook Trout) collected in 10 drainage regions. For the 2011 to 2012 period, measurements were made in 247 fish.
Source: Environment and Climate Change Canada (2017) Chemical Management Plan Monitoring and Surveillance.

Table A.2. Data for Figure 1. PentaBDE concentrations in Lake Trout from Lake Ontario, Canada, 1997 to 2015

Year	Sample size	Average concentration (nanograms per gram wet weight)
1997	4	38
1998	4	30
1999	8	32
2000	7	39
2001	4	23
2002	4	31
2003	8	28
2004	8	23
2005	12	26
2006	14	24
2007	11	26
2008	24	28
2009	24	21
2010	10	28
2011	10	16
2012	10	17
2013	10	15
2014	15	19
2015	10	19

Note: In the table, PentaBDE concentrations are expressed as an annual geometric average. In 2013, Environment and Climate Change Canada published Federal Environmental Quality Guidelines for PBDEs to assess the ecological significance of levels of PBDEs in the environment. The Federal Environmental Quality Guideline for pentaBDE in fish tissues is 1 nanogram per gram of wet weight.
Source: Environment and Climate Change Canada (2017) National Fish Contaminants Monitoring and Surveillance Program.

Table A.3. Data for Table 2. PBDE subgroup concentrations in sediment relative to guidelines by drainage regions, Canada, 2007 to 2016

Sampled drainage regions	Sample size	triBDE (number of exceedences)	tetraBDE (number of exceedences)	pentaBDE (number of exceedences)	hexaBDE (number of exceedences)	octaBDE (number of exceedences)	decaBDE (number of exceedences)
Pacific Coastal (1)	8	0	0	4	0	0	2
Okanagan–Similkameen (3)	5	0	0	2	0	0	0
Columbia (4)	2	0	0	0	0	0	0
Yukon (5)	1	0	0	0	0	0	0
Assiniboine–Red (12)	2	0	0	0	0	0	0
Lower Saskatchewan–Nelson (14)	3	0	0	2	0	0	0
Great Lakes (19)	74	0	1	38	0	0	17
St. Lawrence (21)	200	0	0	72	0	0	40
Maritime Coastal (24)	20	0	0	6	0	0	0
Newfoundland–Labrador (25)	4	0	0	0	0	0	0

Note: The number in parentheses beside the drainage region name represents the identifier number of the drainage region. See Figure 3 for the drainage region map. Measurements were made in 319 surface sediment samples collected in 10 drainage regions between 2007 and 2016.
Source: Environment and Climate Change Canada (2017) Chemicals Management Plan Environmental Monitoring and Surveillance.

Additional information can be obtained at:

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